Colorado and Lavaca Bays
Basin and Bay Expert Science Team

Roadmap To Recommendations: Colorado and Lavaca Basins

Environmental Flows Recommendations Report: Submission to the Colorado and Lavaca Bays Basin and Bay Stakeholders Committee, Environmental Flows Advisory Group, and Texas Commission on Environmental Quality

Roadmap to Recommendations

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Colorado River at Ballinger

Overbank Flows	Qp: 4,900 cfs with Average Frequency 1 per year Regressed Volume is 8,740 to 30,274 (19,507) Regressed Duration is 2 to 11 (4)											
High Flow Pulses	Qp: 107 cfs with Average Frequency 1 per season Regressed Volume is #N/A to 13,380 (2,068) Regressed Duration is 1 to			Qp: 6,080 cfs with Average Frequency 1 per season Regressed Volume is 9,257 to 28,833 (19,045) Regressed Duration is 2 to			Qp: 4,410 cfs with Average Frequency 1 per season Regressed Volume is 5,984 to 27,117 (16,551) Regressed Duration is 2 to			Qp: 4,420 cfs with Average Frequency 1 per season Regressed Volume is 7,608 to 27,245 (17,427) Regressed Duration is 2 to		
				Qp: 3,240 cfs with Average Frequency 2 per season Regressed Volume is 1,076 to 20,648 (10,862) Regressed Duration is 1 to			Qp: 2,200 cfs with Average Frequency 2 per season Regressed Volume is #N/A to 19,672 (9,107) Regressed Duration is 2 to			Qp: 2,000 cfs with Average Frequency 2 per season Regressed Volume is #N/A to 18,274 (8,454) Regressed Duration is 1 to		
Base Flows (cfs)	28	26	19	22	30	41	48	38	40	39	38	33
	(32.5%)	(27.2%)	(30.0%)	(28.4%)	(39.9%)	(63.1%)	(59.4%)	(47.0%)	(41.8%)	(52.8%)	(47.4%)	(36.3%)
	12	11	9.9	9.2	9.9	17	26	16	16	15	16	16
	(54.0%)	(53.2%)	(51.8%)	(47.9%)	(55.4%)	(74.0%)	(72.2%)	(61.2%)	(54.9%)	(66.6%)	(64.4%)	(57.4%)
	4.8	3.6	4.5	3.4	2.4	4.1	9.8	3.3	2.9	3.8	4.4	6.1
	(75.4%)	(73.8%)	(74.6%)	(68.3%)	(71.9%)	(84.5%)	(83.8%)	(72.8%)	(68.0%)	(79.9%)	(76.8%)	(75.8%)
Subsistence Flows (cfs)	0.4	0.3	0.2	0	0	0.2	0.41	0	0	0	0	0.3
	(96.2%)	(95.3%)	(95.8%)	(100.0%)	(100.0%)	(95.3%)	(95.0%)	(100.0%)	(100.0%)	(100.0%)	(100.0%)	(95.2%)
	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
		Winter			Spring			Summer			Fall	

Water Available under current conditions, Run 8

Overbank	xxxxxxxxxxxxxxxxxxxxx			
High Pulses	xxx	XXX	xxx	Xxx
Wet normal	Xxx	xxx	xxx	xxx
Normal	Xxxx	xxx	xxx	xxx
Dry normal	Xxx	xxx	xxx	xxx
Subsistence	xxx	Xxx	xxx	xxx

Water Available under permits, Run 3

Overbank	xxxxxxxxxxxxxxxxxxxxx			
High Pulses	xxx	xxx	xxx	xxx
Wet normal	xxx	xxx	xxx	xxx
Normal	xxx	xxx	xxx	xxx
Dry normal	xxx	xxx	xxx	xxx
Subsistence	xxx	xxx	xxx	xxx

Colorado River at Ballinger, USGS 08126380

Runnels County, Texas
Hydrologic Unit Code 12090101
Latitude 31°42'55", Longitude 100°01'34" NAD27
Drainage area 16,358 square miles
Contributing drainage area 6,098 square miles
Gage datum 1,606.51 feet above sea level NGVD29

EPA Level III Ecoregion: Central Great Plains

Google Earth Review:
Reach reviewed: 9 river miles from the USGS gage downstream to confluence with Elm Creek south of Ballinger and 54 miles from the USGS gage upstream to the dam for Lake Spence.

Flows for aerial photography dates:

- March 1 1997: 192 cfs
- October 21, 2005: 7.7 cfs
- October 30, 2008: 0.62 cfs
- February 14, 2010 4.4 cfs

Mesohabitats: This reach of the river is characterized primarily by long reaches of relatively straight glides and pools separated by riffle-run reaches upstream of the gage and with shallow runs and some rocky riffles downstream of the gage. The reach upstream of the USGS gage had 4 low water dams, a number of tributaries and backwater areas, with some low areas adjacent to the river which are classified as wetlands. Oxbows were not observed in the floodplain. The reach downstream of the USGS gage had additional habitat provided by the mouths of 3 tributaries and 1 island.

Field Observations:
BBEST members observed the site on September 2, 2010. The provisional flow at the USGS gage was 0.0 cfs however an estimated flow of 1.5 cfs was observed. Relatively short riffles, pools and runs were observed near the gage. Benthic macroinvertebrates observed on cobble in the riffle included damselfly nymphs, riffle beetles, nails, the Asian clam, filamentous green algae, Tampico pearly mussel and spike rush.

On October 13, 2010, TPWD and TWDB staff made observations of the riparian and floodplain community in the vicinity of the USGS gage. Vegetation present included cattails and water willow in the river, switch grass, Baccharis, and salt cedar near the river with ragweed, button bush, poison ivy, soapberry, huisache, black willow, American elm, mesquite, and hackberry higher on the bank and further from the river. Of the species encountered in the riparian zone, button bush is the only species considered an obligate wetland species.

Soil Types:
Soil type data were obtained from the Natural Resource Conservation Service for a 1.5 mile stretch along the river. The soil type found adjacent to the river in this reach was the Colorado and Yahola soils.

Colorado and Yahola soils are found on flood plains in river valleys and experience occasional flooding, but water does not pond on these soils.

Wetlands:
National Wetland Inventory data are available for this portion of the river and indicate several areas adjacent to the river which are relatively flat and about 3-7 ft above the water level. Some of these areas support facultative wetland shrubs and grasses. These areas are expected to flood on an occasional basis. No oxbows were observed along the river

Texas Ecological System Classification:
Texas Ecological System Classification of vegetative communities is available for a 5 mile reach of the river extending about 2.5 miles upstream and 2.5 miles downstream of the confluence with Elm Creek. The Edwards Plateau floodplain herbaceous vegetation community with a variety of grasses and some plateau live oak and mesquite trees covers the greatest area of the floodplain. Patches of Edwards Plateau deciduous shrubland and Edwards Plateau hardwood vegetative communities are common.

National Weather Service Advanced Hydrologic Prediction Service:
Flood stage occurs at 18 ft above the USGS gage elevation.

Flow interpretations:
Subsistence flows: The river ceases flowing in reaches at flows at least as low as 0.62 cfs.flows. At this flow, long pools and glides appear to persist. The river appears to be perennial at flows of at least 4.4 cfs.

Base flows: Presence of a variety of benthic macroinvertebrates, Tampico pearly mussels, cattails, and water willow indicate the existence of a perennial water body.

Pulses and overbank flows: Soil types adjacent to the river indicate occasional flooding although the relatively widely scattered presence of typical riparian and floodplain vegetation indicates flooding is probably infrequent. The presence of button bush, salt cedar, hackberry, and American elm indicate episodic wet conditions.

Environmental flow regime summary:
A sound environment in this reach of the Colorado River may occur when flows exceed 1 cfs and periods of flow below 1 cfs are not extensive. Pulse flows that raise water level will flood bars and wetlands adjacent to the river. Pulses and overbank flows are valuable however the frequency of occurrence should be relatively low.